REMARKS

Further and favorable reconsideration is respectfully requested in view of the foregoing amendments and following remarks.

Claim 1 has been amended to incorporate the limitations of claims 2 and 4, as a result of which claims 2-4 have been cancelled. New claim 21 has been added to the application. Support for new claim 21 can be found on page 4, lines 10-16 of the specification.

The patentability of the present invention over the disclosures of the references relied upon by the Examiner in rejecting the claims will be apparent upon consideration of the following remarks.

Thus, the rejection of claims 1-10, 12, 13 and 16-20 under 35 U.S.C. § 103(a) as being unpatentable over Nakamura et al. is respectfully traversed.

Applicants have amended claim 1 to incorporate the limitations of claims 2 and 4. Nakamura et al. do not disclose a method of fabricating a steel part, comprising preparing and casting a steel, wherein the steel contains 5 ppm to 50 ppm of B, and 0.005 % to 0.04% of Ti, where the Ti content is equal to at least 3.5 times the N content of the steel. The reference does not teach that it is imperative for Ti and N to be present in this ratio. On the contrary, Applicants recognize that boron can improve quenchability, but needs to be in solid form in order to be effective. (See page 7, lines 22-29 of Applicants' specification.) Therefore, Applicants realize that boron needs to be in the form of boron nitrides or carbon nitrides, and therefore it is recommended to associate adding boron with adding titanium, in a proportion such that the Ti content is equal to at least 3.5 times the N content. This requirement is not taught or suggested in the Nakamura et al. reference.

The Examiner asserts that the heating and cooling of steel 31 (in table 1 of the reference) is similar to Applicants' claimed process. Specifically, the Examiner states that Table 1 discloses cooling at 18°C/s. However, such a high cooling speed cannot be reached during still air or forced air cooling, as required by Applicants' claimed process. Therefore, the process relied on by the Examiner does not teach or suggest each and every limitation of the process set forth in Applicants' claim 1.

The disclosure of Nakamura et al. relates to a treatment for obtaining plates or sheets by hot-rolling a slab, which is a flat product. (See column 10, line 63, column 13, lines 47, 49 and 64, column 14, lines 5 and 11 and column 15, line 31 of the reference.) On the contrary,

Applicants' claim 17 recites that the hot deformation is forging. Nakamura et al. teach hot rolling, rather than forging, and therefore do not suggest the limitations of Applicants' claim 17.

Furthermore, claim 18 specifically recites a method wherein controlled cooling of the blank is performed at a rate less than or equal to 3°C/s. The speed of 18°C/s, as taught by Nakamura et al., is clearly outside the range recited in Applicants' claim 18. Although the reference teaches a cooling rate of not slower than 1°C/s, the reference clearly teaches away from slow cooling rates. All of the Examples in Table 1 employ a cooling rate of 12°C/s or higher. The examples of Table 3 show a cooling rate of at least 3.5°C/s. Column 8, line 58 of the reference teaches a cooling rate of 55°C/s. Other than one arbitrary statement regarding a cooling rate of not lower than 1°C/s, there is no disclosure in the Nakamura et al. reference to direct one to apply a cooling rate of less than or equal to 3°C/s. All of the working examples in the reference apply a much higher cooling rate. In fact, Applicants claim recites an upper limit for the cooling rate while the reference recites a lower limit. The reference teaches away from applying a slower cooling rate, because the reference states that decreased strength will result.

Claim 20 and new claim 21 recite that the steel part possesses bainite microstructure. The cooling speed of 18°C/s, taught by Nakamura et al., results in a martensitic structure for the final steel product. In fact, any cooling rate between 12 and 50°C/s, (the range shown in table 1 of the Nakamura et al. reference) results in a martensitic structure. Nakamura et al. state that when the cooling is carried out at a cooling rate of not slower than 1°C/s, the formation of a bainite structure containing coarse carbides can be suppressed and the strength can be increased to a satisfactory level even in the core of the steel product. (See column 6, lines 39-45 of the reference.) Therefore, Nakamura et al. teach away from a steel part possessing bainite microstructure, as set forth in Applicants' claims 20 and 21.

Additionally, the Nakamura et al. reference relates to low-carbon steels which are intended for hot-rolled sheets or plates. (See column 10, line 63, column 13, lines 47, 49 and 64, column 14, lines 5 and 11 and column 15, line 31 of the reference.) The steel plates and sheets must be weldable and have a good toughness. (See column 1, lines 9 and 66 of the reference.) The contents of P, S, N and Se in the Nakamura et al. steel must be strictly limited so that toughness is not diminished. (See column 4, line 65 to column 5, line 11 of the reference.) On the contrary, Applicants' claims allow a much larger amount of S and Se. Specifically, Applicants' claims 6 and 7 recite that the steel contains 0.005% to 0.2% of S and up to 0.05% of

Se. Therefore, Nakamura et al. teach away from Applicants' upper limits for both S and Se, which are added to improve machinability. The quality of machinability is not even discussed by the Nakamura et al. reference. Further, Applicants' invention does not require a particular upper limit for P or N, provided the Ti content is at least 3.5 times the N content, as recited in Applicants' amended claim 1.

Nakamura et al. also strictly limit the amount of Si to no more than 0.4%, preferably no more than 0.2%. (See column 4, lines 50-62 of the reference.) On the contrary, Applicants' invention tolerates up to 3% Si, because a high amount of toughness is not necessary in Applicants' invention.

Nakamura et al. requires a good balance between tensile strength [referred to as TS in the reference, Rm by Applicants], toughness and weldability. The result of this balance is that the Rm values of the examples in Nakamura et al. fall between 470 and 850 MPa. On the contrary, Applicants' invention allows for the tensile strength to reach 1300 MPa.

Since claims 5-10, 12, 13, and 16-21 are directly or indirectly dependent on claim 1, the subject matter of claims 5-10, 12, 13, and 16-21 is patentable over Nakamura et al. for the same reasons that the subject matter of claim 1 is patentable over this reference.

For these reasons, the invention of claims 1, 5-10, 12, 13 and 16-21 is clearly patentable over Nakamura et al.

The rejection of claims 1-20 under 35 U.S.C. § 103(a) as being unpatentable over JP '246 is respectfully traversed.

The Examiner asserts that the English abstract of JP '246 discloses a steel alloy which contains constituents with wt% ranges that overlap with those recited by Applicants in claims 2-10. As discussed previously, the limitations of Applicants' claims 2 and 4 have been incorporated into claim 1. Therefore, claim 1 now recites that the steel contains 0.005% to 0.04% Ti, wherein the Ti content is equal to at least 3.5 times the N content of the steel. JP '246 teaches a much larger amount of Ti than is permitted in Applicants' amended claim 1. The abstract of JP '246 teaches that 0.6% Ti may be added to the steel. Further, any of the compositions shown in Table 1 of the reference which include Ti, include a much larger amount than permitted by Applicants' claim 1. Therefore, JP '246 does not disclose a steel alloy with all of the constituents with wt% ranges which overlap with Applicants' claims.

Furthermore, JP '246 does not teach that hot deformation is performed at a temperature in the range of 1100°C to 1300°C, as required by Applicants' claim 1. The Examiner asserts that such a temperature range would be expected, since JP '246 starts cooling after hot deforming at 900°C or less. However, the Examiner has cited no evidence to support the conclusion that such a temperature would be expected. The reference does not teach or suggest performing the hot deformation step at the temperature recited in Applicants' claim 1. In the absence of such evidence, Applicants respectfully submit that rejection is based on hindsight, which is improper according to U.S. practice, and the rejection should therefore be withdrawn. In re Zurko, 59 USPQ2d 1693.

Since claims 2-21 are directly or indirectly dependent on claim 1, the subject matter of claims 2-21 is patentable over JP '246 for the same reasons that the subject matter of claim 1 is patentable over this reference.

For these reasons, the invention of claims 1-21 is clearly patentable over JP '246.

Therefore, in view of the foregoing amendments and remarks, it is submitted that each of the grounds of rejection set forth by the Examiner has been overcome, and that the application is in condition for allowance. Such allowance is solicited.

Respectfully submitted,

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